March 10, 1925. 1,529,204

E. MORTERUD

PROCESS FOR DIRECT HEATING OF DIGESTERS WITH FORCED CIRCULATION

Filed March 10, 1924

Fig. 1.

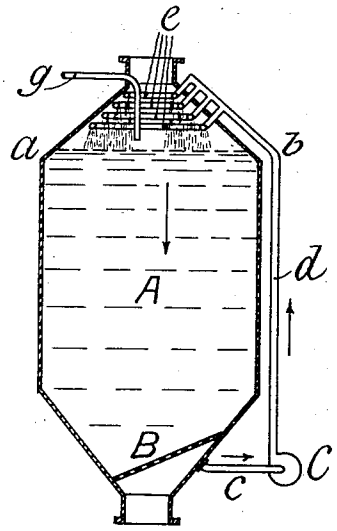


Fig. 2.

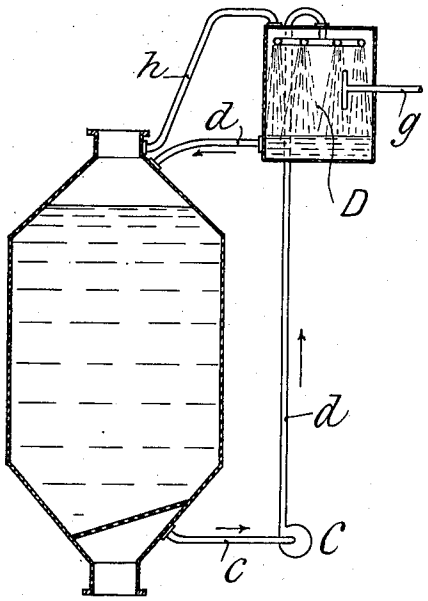


Fig. 3.

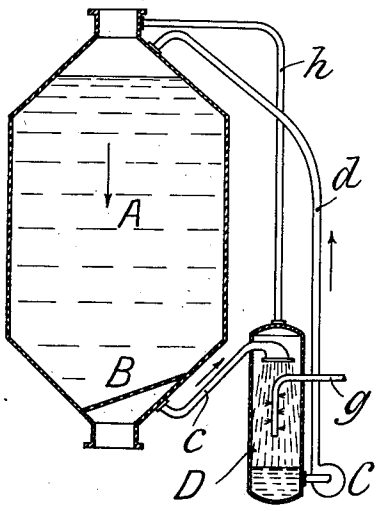
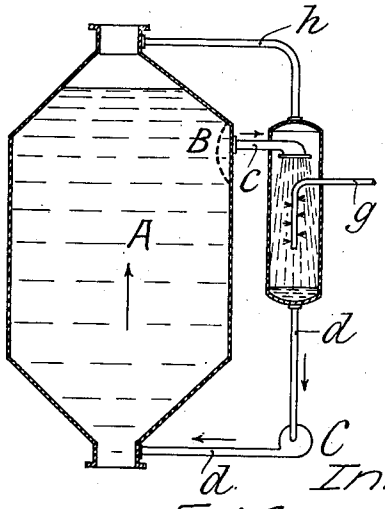


Fig. 4.



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UNITED STATES PATENT OFFICE.

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PROCESS FOR DIRECT HEATING OF DIGESTERS WITH FORCED CIRCULATION.

Application filed March 10, 1924. Serial No. 698,338.

To all whom it may concern:

Be it known that I, EINAR MORTERUD, engineer, a subject of the King of Norway, residing at Torderod, near Moss, Norway, have invented certain new and useful Improvements in Processes for Direct Heating of Digesters with Forced Circulation; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings, and to letters or figures of reference marked thereon, which form a part of this specification.

The present invention relates to pulp digesters with forced circulation and direct heating.

The direct heating of pulp digesters by means of steam generally takes place by introducing jets of steam into the liquid which has the effect of causing clashing of the liquid surfaces against each other upon the condensing of the steam which is introduced. This clashing causes a number of inconveniences, such as noise, liberation of gases and shocks in the digester.

The present invention has for its object a method for the direct heating of pulp digesters, in which the above mentioned drawbacks are avoided. The method consists in introducing the circulated liquid in the form of sprays, films or the like into a space, in which the steam may surround the liquid freely and condense against the liquid surfaces without causing shocks.

The efficiency of the heating transmission between steam and liquid in this manner is equivalent to the efficiency of the known method, and the final result is a mixture of condensed steam and liquid as in ordinary direct heating.

As it will be understood it is necessary that the condensing space is under a sufficient pressure to prevent the device from operating as a jet condenser. This pressure may be obtained either by means of surplus steam, so as to make the liquid surface insufficient for full condensation, or by the presence of a non-condensing gas.

In order to prevent liberation of gas from the digester liquid, it is necessary that the liquid which is divided in films, sprays or the like is again collected with the least possible shock effect, for instance, by checking the fall of the liquid or letting the liquid drop from a small height.

On the drawing Fig. 1 is a diagrammatical section of the sulphite digester for carrying out the present method.

Fig. 2 illustrates a modified form of digester.

Fig. 3 shows a further modification, and

Fig. 4 a still further modification.

On Fig. 1 A is the digester, which is provided with a sieve B. The digester is filled with pulp and acid up to line *a*—*b*. The acid is circulated by means of pump C through tubes *c*, *d* and is distributed in the form of a spray through the perforated tubes *e* in the top of the cooker. Steam is introduced through tube *g*, which may preferably also be perforated. The top of the digester then operates as a spray- and drop-heater and SO_2 gas is the medium which serves to maintain the pressure.

On the modification illustrated on Fig. 2 the heater is formed by a separate vessel D. The circulated liquid is pumped to the spray member *e* of this vessel and is conducted to the top of the digester.

According to the arrangement shown on Fig. 3 the heating vessel D is mounted below the digester, and the pump serves to transfer liquid from the bottom of the heating vessel D to the top of the digester A. A tube *h* connects the top of the heating vessel with the gas space of the digester in order to maintain the pressure.

According to the further modification illustrated on Fig. 4 the heating vessel D is supplied with liquid from the upper part of the digester, and then liquid is transferred from the bottom of heating vessel D to the lower part of digester A.

Claims:—

1. In a process for digesting pulp where forced circulation of the digesting liquid is maintained, the method which consists in distributing the liquid in films, sprays or drops in a space, into which steam is introduced, with the object of obtaining proper condensation of the steam on the liquid surface without causing shocks.

2. In a process for digesting pulp where forced circulation of the digesting liquid is

maintained, the method which consists in distributing the liquid in films, sprays or drops in a space in a separate heating vessel, into which steam is introduced and from which the heated liquid is conducted back to the digester with the object of transmitting the condensing heat of the steam to extended liquid surfaces without causing shocks or splashes.

3. The combination with a digester for pulp of a spray condenser, means for introducing heating steam into said condenser and means for circulating the digesting liquid through said digester and said spray condenser.

4. The combination with a pulp digester of a spray condenser separate from the digester, means for introducing heating steam in said condenser and means for circulating the digesting liquid through said digester and said condenser.

5. The combination with a pulp digester of a spray condenser separate from said digester, means for introducing jetting steam in said spray condenser, means for circulating the digesting liquid through said spray condenser and said digester and means for maintaining in the said condenser the same pressure as in the digester.

In testimony that I claim the foregoing as my invention, I have signed my name in presence of two subscribing witnesses.

EINAR MORTERUD.

Witnesses:

DAGNY SZVERSEN,

S. GULLICHREN.